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HAEMATOLOGICAL RESPONSE OF LAYING GUINEA FOWL TO DIET CONTAINING VITAMIN E AND SELENIUM YEAST SUPPLEMENTED WITH OR WITHOUT L-ARGININE

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ABSTRACT

A 70 days study was carried out to investigate the response of guinea fowl fed diets containing vitamin E, selenium yeast supplemented with or without L-arginine on laying performance and blood parameters. A total of two hundred and forty (240), twenty weeks old (average weight of 2.11± 0.02kg), helmeted guinea fowls were allotted into 8 dietary treatment. Each treatment was replicated thrice with 10 birds each in a completely randomized design. Dietary treatments were arranged in a 4 x 2 factorial arrangements of 4 additives (no additive, Se Yeast (0.3 mg/kg), Vitamin E (30 IU/kg), Selenium yeast + vitamin E) supplemented with or without 1g/kg L-arginines. Blood samples of the guinea fowl were collected from all the treatment groups and transported to the laboratory for analysis. Results generated were analyzed using analysis of variance (ANOVA). There were no significant differences (P>0.05) in all the haematological parameters measured. It was concluded that inclusion of vitamin E + Selenium yeast, supplemented with L-arg posed no threats on the egg laid and health status of the laying guinea fowls.

Keywords: haematology, laying guinea fowl, selenium yeast, Vitamin E

INTRODUCTION

Guinea fowl production as a rural poultry enterprise has a lot of potential if kept and managed well (Agbolosu *et al.,* 2015). This is evident in West Africa where domesticated helmeted Guinea fowls are widely exploited (Adeola *et al.,* 2015). They are a ready source of animal protein (meat and eggs), income, as well as being a source of manure for soil enrichment (Agbolosu *et al.,* 2015). Their lean meat with its characteristic flavour is relished by the local farmers and can contribute substantially to the protein needs of the rural populations (Panyako *et al.,* 2016). However, there is need for increased effort aimed towards improving and increasing guinea fowl production. Selenium (Se) and vitamin E played significant role in improving immunity, antioxidant status, and reproduction in animals. Selenium is required for the development and expression of non-specific humoral and cell mediated immune responses (Salmon *et al.,* 2009). L-arginine has been considered a powerful secretagogue that helps to increase the release of the growth hormone, insulin, mediated by insulin-like growth factor IGF-I in the blood stream (Newsholme *et al.,* 2005) and synthesis of Nitric oxide, a highly reactive and short-lived radical implicated in regulating the reproductive functions in poultry (Fouad *et al.*2012). Available evidence also revealed that the pathway of arginine nitric oxide (N_O) help to reduce oxidative stress in birds as well as scavenging for free radicals. However, low attention has been given to arginine in comparison to other amino acids in commercial feed formulations for guinea fowls. In most cases, only the feed-grade amino acids, such as lysine, methionine, and threonine, are present in the ingredient matrix software that considers the least-cost feed formulation used by the poultry industry, mainly because it has not yet been determined whether the benefits of arginine supplementation supersedes its costs (Kidd *et al*., 2013). Therefore, this research was conducted to investigate the haematological response of laying

helmeted guinea fowl to diets containing selenium yeast, vitamin E supplemented with and without arginine.

MATERIALS AND METHODS

Experimental site

The study was carried out at the Poultry Unit, Institute of Food Security, Environmental Resources and Agricultural Research (IFSERAR), Federal University of Agriculture, Abeokuta, Ogun State, Nigeria. The farm is located in derived savannah vegetation zone of South Western Nigeria on Latitude $7^0$13'35.48"N, Longitude $3^0$25'39.01"E with an elevation of 415 feet and eye altitude of 700 feet (Google Earth, 2017).

Test ingredients

The L-arginine (Shanghai TECH, Chemical Industry testing Co Ltd, Shanghai, People' Republic of China), Vitamin E as all-rac-α-tocopheryl acetate (Rovimix® E50-Adsorbate) and Selenium yeast (Se Yeast) (Alltech, Inc., Nicholasville, KY) used in this study were purchased commercially.

Experimental design and dietary treatments

A total of two hundred and fourty (240), twenty weeks old (average weight of 2.11± 0.02kg), helmeted breeding guinea fowls were allotted into 8 dietary groups, each treatment having 3 replicates of 10 birds in a completely randomized design. Dietary treatments were arranged in a 4 x 2 factorial arrangements of 4 additives (no additive, Se Yeast (0.3 mg/kg), Vitamin E (30 IU/kg), Selenium Yeast + vitamin E) supplemented or not with 1g/kg L-arginine. Recommendation levels of various additives used were based on manufacturer's specification. Each pen was an open-sided unit which had a concrete floor littered with wood-shavings. Maximum and minimum temperature of 31.9 °C and 29.7 °C respectively, existed within the deep litter laying pen. A cycle of natural 12 h of day light and 12 h of dark existed throughout this trial. A standard layers ration was formulated for the study (Table 1). The experiment lasted for a period of 10 weeks. Feed in mash form and water were provided *ad libitum*.

Table 1: Gross composition of the experimental diet

Ingredient (kg)	Layer diet (20 – 30 weeks old)
Maize	63
Soyabean meal	23
Wheat offal	8.8
Bone meal	1.7
Limestone	2.6
Lysine	0.15
Methionine	0.20
Premix	0.3
Salt	0.25
Total	**100.00**
Calculated values (%)	
Crude protein	17.26
Crude fibre	3.24
Calcium	3.67
Available phosphorus	0.49
Metabolizable energy (MJ/kg)	10.77
Lysine	0.71
Methionine+Lysine	0.62

Blood collection and analysis

At the end of 70 days experimental period, blood samples (2.5 ml each) were collected randomly from two guinea fowls per replicate with needle and syringe through the jugular vein directly into EDTA-containing bottles for the determination of haematological indices. Parameters measured includes packed

cell volume (PCV), red blood cell (RBC), white blood cell (WBC) and differential leukocyte counts. These were determined according to the standard routine haematological procedures for avian (Weiss and Wardrop, 2010).

Statistical Analysis

Data generated from the experiment were subjected to 4 x 2 factorial arrangement. All data were analyzed using complete randomized design using general linear model procedure of SAS (2003) while the significant means were separated by Duncan Multiple Range Test as outlined by Daniel (1991).

RESULTS

The effect of L-Arginine supplementation and addition of additives (selenium and vitamin E) on haematological indices of laying guinea fowl is shown in Table 2. There were no significant differences (P>0.05) in all the parameters measured.

Table 2: Interaction effect of L-Arginine supplementation and addition of additives on the haematological indices of laying guinea fowl.

	- Arginine				+ Arginine				
Parameters	**Control**	**Se**	**Vit E**	**Vit E+Se**	**Control**	**Se**	**Vit E**	**Vit E+Se**	**SEM**
PCV (%)	55.00	40.00	57.00	50.00	54.00	52.00	51.00	52.00	2.24
Hb (g/dl)	18.30	13.30	19.30	16.70	18.10	17.60	17.10	17.50	3.11
RBC ($\times10^{12/L}$)	4.60	3.30	4.80	4.20	4.40	4.50	4.10	4.30	0.30
WBC ($\times10^{9/L}$)	12.10	10.40	11.10	12.60	10.60	9.50	14.50	11.40	1.03
HET (%)	37.00	30.00	28.00	31.00	40.00	33.00	27.00	30.00	4.01
LYM (%)	61.00	67.00	72.00	65.00	58.00	66.00	70.00	65.00	3.91
EOS (%)	1.00	1.00	0.00	2.00	0.00	0.00	1.00	2.00	0.75
BAS (%)	0.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	0.22
MONO (%)	1.00	1.00	0.00	1.00	2.00	0.00	2.00	2.00	0.22
MCV (Fl)	119.60	121.20	118.80	119.00	122.70	115.60	124.40	120.90	3.20
MCH (Pg)	39.80	40.30	40.20	39.80	41.10	39.10	41.70	40.70	2.28
MCHC (g/dl)	33.30	33.30	33.90	33.40	33.50	33.80	33.50	33.70	0.15

[abcd]Means on the same row having different superscripts are significantly different (P<0.05) PCV = Packed cell volume, HB = Hemoglobin, RBC = Red blood cell, WBC = White blood cell, HET = Heterophil, = LYM = Lymphocytes, EOS = Eosinophil, BAS = Basophil, MONO = Monocytes, MCV = Mean corpuscular volume, MCH = Mean corpuscular hemoglobin, MCHC = Mean corpuscular hemogbobin concentration, SEM = Pooled standard error of means.

DISCUSSION

Haematological parameters are important indices that reflect the physiological state of the individual animal. The ability to interpret blood profile in healthy and diseased conditions is one of the primary objectives of haematological studies (Togun and Oseni, 2005). The non- significant effect of Arginine on other haematological indices indicated that Arginine supplementation posed no adverse effect on the health status of guinea fowl. This corroborates the findings of Emadi *et al*. (2010), and Oso *et al.* (2017)

who reported that L- Arginine supplementation posed no negative effect on health status but rather improved some blood traits of broilers.

Conclusion and Recommendations

Based on the results of this study, it could be concluded that inclusion of vitamin E. and Selenium supplemented with L-arginine posed no threats on the health status of the laying guinea fowls. Further studies should be conducted by using other poultry birds such as turkey, quail and broilers.

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